IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Appellants:	John Zagaja, et al.	Group Art Unit:	1742
Serial No.:	10/604,670	Examiner:	Lois L. Zheng
Filed:	August 8, 2003		
For:	ELECTROCHEMICAL CELL SUPPORT STRUCTURE		

VIA ELECTRONIC FILING
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

APPEAL BRIEF

I. REAL PARTY IN INTEREST

The real party in interest in this appeal is Proton Energy Systems, Inc.

II. RELATED APPEALS AND INTERFERENCES

There are no related appeals or interferences known to Appellants, Appellants' legal representatives, or assignee that will directly affect, be directly affected by, or have a bearing on the Board's decision in the pending appeal.

III. STATUS OF THE CLAIMS

Claims 1-27 and 30-32 are pending in the application, while Claims 28 and 29 have been cancelled.

Claims 1-27 and 30-32 stand finally rejected.

No Claims stand objected to, withdrawn, or allowed.

Claims 1 – 27 and 30 – 32, as they currently stand, are set forth in the Claims Appendix. Appellants hereby appeal the final rejection of Claims 1 – 27 and 30 – 32.

IV. STATUS OF THE AMENDMENTS

No amendments have been filed subsequent to the Final Rejection dated October 19, 2006. All prior amendments have been entered.

V. SUMMARY OF CLAIMED SUBJECT MATTER

This application relates to an electrochemical cell, comprising a first electrode and a second electrode with a membrane disposed therebetween (Supported at least at Page 7, lines 15 - 16, and Page 11, lines 15 - 18, and FIG. 3) and in ionic communication with the first electrode and the second electrode (Supported at least at Page 7, lines 16 - 18, and Page 13, lines 17 - 23); and a sintered porous support member (Supported at least at Page 20, lines 1 - 3) disposed on a side of the membrane opposite the second electrode (Supported at least at Page 7, lines18-20), wherein the support member comprises a first portion on first side of the support member proximate the membrane and a second portion disposed on a side of the first portion opposite the membrane, wherein the second portion has a second portion porosity different from a first portion porosity (Supported at least at Page 7, line 20 - Page 8, line 1).

In one embodiment, such as set forth in Claim 2, the second portion porosity is greater than the first portion porosity (Supported at least at Page 21, lines 5 - 19).

In one embodiment, such as set forth in Claim 3, the first portion porosity is less than or equal to about 60% (Supported at least at Page 21, lines 5 – 19, and Claim 3 as originally filed).

In one embodiment, such as set forth in Claim 4, the first portion porosity is about 35% to about 50% (Supported at least at Page 21, lines 5 – 19, and Claim 4 as originally filed).

In one embodiment, such as set forth in Claim 5, the second portion porosity is greater than or equal to about 50% (Supported at least at Page 21, line 23 – Page 22, line 1).

In one embodiment, such as set forth in Claim 6, the second portion porosity is about 50% to about 70% (Supported at least at Page 22, lines 1 – 2).

In one embodiment, such as set forth in Claim 7, the support member comprises a third portion disposed on a side of the second portion opposite the first portion, wherein the third portion has a third portion porosity that is less than or equal to the second portion porosity (Supported at least at Page 21, lines 5 - 21).

In one embodiment, such as set forth in Claim 8, the support member comprises a plurality of layers, wherein each layer has a layer porosity of greater than or equal to a previous layer (Supported at least at Page 21, lines 5 - 21).

In one embodiment, such as set forth in Claim 9, the support member is a single layer comprising a decreasing porosity gradient from the first side toward a second side disposed opposite the first side (Supported at least at Page 20, lines 1 - 10).

In one embodiment, such as set forth in Claim 10, the support member further comprises a second side comprising a channel (Supported at least at Page 22, lines 11 - 21).

In one embodiment, such as set forth in Claim 11, the channel extends from an inlet disposed proximate an edge of the side to a terminus disposed proximate a geometric center of the side (Supported at least at Page 23, lines 1 - 9, and FIG. 4).

In one embodiment, such as set forth in Claim 12, the channel extends from an inlet disposed proximate an edge of the side to an outlet disposed proximate the same or a different edge of the side (Supported at least at Page 23, lines 14 - 23, and FIG. 5).

In one embodiment, such as set forth in Claim 13, the second portion comprises higher porosity regions and lower porosity regions (Supported at least at Page 25, lines 10 - 23).

In one embodiment, such as set forth in Claim 14, further comprising a pressure pad disposed in physical and electrical communication with the support member (Supported at least at Page 13, lines 7 - 14).

In one embodiment, such as set forth in Claim 15, further comprising an additional sintered porous support member disposed on a side of the membrane opposite the support member (Supported at least at Page 13, lines 8 - 14).

In one embodiment, such as set forth in Claim 16, wherein the additional support member comprises the second electrode (Supported at least at Page 12, lines 5 - 8, and Page 16, line 18 – Page 17, line 13).

In one embodiment, such as set forth in Claim 17, the additional support member further comprises a first additional portion on first side of the additional support member proximate the membrane and a second additional portion disposed on a side of the first additional portion opposite the membrane, wherein the second additional portion has a second additional portion porosity different from a first additional portion porosity (Supported at least at Page 17, line 14 - Page 18, line 3).

In one embodiment, such as set forth in Claim 18, the second additional portion porosity is greater than the first additional portion porosity (Supported at least at Page 21, lines 5 - 13).

In one embodiment, such as set forth in Claim 19, the support member further comprises the first electrode (Supported at least at Page 12, lines 5 - 8, and Page 16, line 18 – Page 17, line 13).

This application also relates to, such as set forth in Claim 20, an electrochemical cell, comprising a first electrode and a second electrode with a membrane disposed therebetween and in ionic communication with the first electrode and the second electrode (Supported at least at Page 7, lines 14 - 18); a flow field consisting essentially of a sintered porous support member disposed in electrical and physical communication with the first electrode (Supported at least at Page 8, lines 6 - 8); and a pressure assembly disposed in physical and electrical communication with the flow field (Supported at least at Page 8, lines 9 - 11).

In one embodiment, such as set forth in Claim 21, the support member further comprises a first portion adjacent the membrane and a second portion on a side of the first portion opposite the membrane, and wherein the second portion has a second portion porosity different from a first portion porosity (Supported at least at Page 26, lines 5 - 12).

In one embodiment, such as set forth in Claim 22, the second portion porosity is greater than the first portion porosity (Supported at least at Page 21, lines 5 - 19).

In one embodiment, such as set forth in Claim 23, the support member further comprises the first electrode (Supported at least at Page 12, lines 5 - 8, and Page 16, line 18 – Page 17, line 13).

In one embodiment, such as set forth in Claim 24, the support member is configured to support the membrane at pressures of greater than or equal to about 100 psi (Supported at least at Page 28, lines 9 - 12).

In one embodiment, such as set forth in Claim 25, the pressures are greater than or equal to 500 psi (Supported at least at Page 28, lines 20 - 22).

In one embodiment, such as set forth in Claim 26, the porous support member comprises a channel (Supported at least at Page 22, lines 5 - 19).

In one embodiment, such as set forth in Claim 27, the pressure pad assembly is a pressure pad (Supported at least at Page 11, line 21 – Page 12, line 4, and Claim 27 as originally filed).

In one embodiment, such as set forth in Claim 30, the channel is disposed between the first portion and the second portion (Supported at least at Page 24, line 16 – Page 25, line 9)

In one embodiment, such as set forth in Claims 31 and 32, the first portion is a first layer and the second portion is a second layer (Supported at least at Page 19, lines 7 - 15).

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

1. **Figures 10 and 12 are objected to as allegedly not being discussed in the Specification.**

2. **Claims 1 – 7, 10, 13 – 15, 17, 18, 20 – 22, and 24 – 27 stand rejected under 35 U.S.C. §102(b), as allegedly anticipated by U.S. Patent No. 5,372,689 to Carlson et al.**

3. **Claims 1-5, 8, 15, 17, 18, and 31 stand rejected under 35 U.S.C. § 102(e), as allegedly anticipated by U.S. Patent Publication No. 2002/0086195 A1 to Gorman et al.**

4. **Claim 20 stands rejected under 35 U.S.C. § 102(e), as allegedly anticipated by U.S. Patent Publication No. 2003/0230495 A1 to Anderson et al.**

5. **Claims 16, 19, and 23 stand rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over U.S. Patent No. 5,372,689 to Carlson et al.**

6. **Claim 9 stands rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over Carlson et al. in view of U.S. Patent No. 6,365,032 B1 to Shiepe et al.**

7. **Claim 9 stands rejected under 35 U.S.C. § 103(a) as allegedly unpatentable over Carlson et al. in view of U.S. Patent Publication No. 2004/0183055 A1 to Chartier et al.**

8. **Claims 11, 12, and 30 stand rejected under 35 U.S.C. §103(a), as allegedly unpatentable over Carlson et al. in view of U.S. Patent No. 6,666,961 B1 to Skoczylas et al.**

9. **Claims 6, 9, 16, and 19 stand rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over Gorman et al.**

10. **Claims 10-12 and 30 stand rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over Gorman et al. in view of Skoczylas et al.**

11. **Claim 13 stands rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over Gorman et al. in view of Carlson et al.**

12. **Claims 14, 20-25, 27, and 32 stand rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over Gorman et al. in view of Shiepe et al.**

13. **Claim 26 stands rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over Gorman et al. in view of Shiepe et al., further in view of Skoczylas et al.**

VII. ARGUMENT

1. Figures 10 and 12 are discussed in the Specification.

Appellants respectfully submit that the Specification supports Figure 10 on Page 10, lines 19 - 20, and that Figure 12 is supported on Page 28, lines 1 – 2. Hence, Appellants respectfully request reversal of this objection.

2. Claims 1 – 7, 10, 13 – 15, 17, 18, 20 – 22, and 24 – 27 are not anticipated by Carlson et al.

Carlson et al. teach an ion exchange membrane supported by a single porous sheet disposed between the anode and a screen set. Carlson et al. disclose a "porous sheet 14 is perforated having multiple-pore sizes". (Col. 3, lines 48 – 50) However, Carlson et al. fail to teach multiple porosities.

To anticipate a claim, a reference must disclose each and every element of the claim. *Lewmar Marine v. Varient Inc.*, 3 U.S.P.Q.2d 1766 (Fed. Cir. 1987).

Appellants' independent claims disclose a porous support member comprising a first portion and a second portion wherein the porosity of the first portion differs from the porosity of the second portion.

Carlson et al. do not teach a porous support member comprising a first portion and second portion of differing porosities. Contrary to the Office Action, Carlson et al. focus on pore size, not porosity. Disclosure of multiple-pore sizes is not a disclosure of different portions with different porosities. Carlson et al. are interested in dual-directional flow of oxygen or hydrogen and water. They discuss porosity in relation to the whole porous sheet "a thin sheet having multiple pore sizes...". (Col. 4, lines 1 – 30) In reply to this explanation, the Examiner contends that,

> Carlson teaches that the porous support member have multiple pore sizes. One of ordinary skill in the art would have realizes [*sic*] that pore size affects porosity. Assuming the same pore spacing larger pore results in higher porosity. Therefore, multiple pores sizes in the porous support member of Carlson leads to multiple portions of the porous support member having different porosities.

(Office Action dated March 7, 2006, hereinafter "OA 03/06", page 15) In the analysis, the Examiner states "Assuming the same pore spacing..." yet fails to explain why such an assumption should be made. Appellants respectfully disagree that Carlson teaches "multiple portions... having different porosities" or that the support member of Carlson would lead to "multiple portions... having different porosities". As explained previously, Carlson et al. are interested in dual-directional flow of oxygen or hydrogen and water. (Col. 3, line 60 – Col. 4, line 9) From this description, it appears that the multiple size pores are distributed throughout the sheet to enable the desired flow. If there were portions having the same size pores (as suggested by the Examiner), it is not understood how the desired flow would be attained. The multiple pore sizes are present to attain simultaneous flow of different substances. Hence, there is no sound basis in technical reasoning to reach the conclusions set forth in OA 03/06. Actually, the conclusion would seem contrary to Carlson et al. as a whole.

In order to support an anticipation rejection based on inherency, an Examiner must provide factual and technical grounds establishing that the inherent feature necessarily flows from the teachings of the prior art. *Ex parte Levy*, 17 U.S.P.Q.2d 1461, 1464 (Bd. Pat. App. &

Int. 1990); *In re Oelrich*, 666 F.2d 578, 581, 212 U.S.P.Q. 323, 326 (C.C.P.A. 1981). When relying on the theory of inherency, the Examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic *necessarily* flows from the teachings of the applied prior art. In the present case, the Examiner has explained that multiple pore sizes are present in the sheet of Carlson et al., but has failed to provide a basis in fact and/or technical reasoning to reasonably support the determination that the porous sheet of Carlson et al. has portions having different porosities. Inherency has not been established, and the alleged inherency appears contrary to the teachings of Carlson et al. as a whole.

Regarding the element of the support member being a sintered porous support member (Claim 1), this limitation is an article limitation since a sintered layer is structurally different than a non-sintered layer. The Examiner contends, "a porous support member can be made by a different process such as a process that does not involve sintering..." (Final Office Action, hereinafter, "FOA 10/06"; page 6) Appellants do not deny that there are several ways that sheets can be formed. However, if these techniques do not process the sheet such that a sintered sheet is produced, the sheet is not covered by the claims. Although "porous sheets" may be able to be formed in different fashions, the formation of a "sintered porous support member" requires that the support member be sintered. FOA 10/06 fails to explain how a process that does not include sintering can form a "sintered" support member.

Appellants claim a particular electrochemical cell with a specific support member, i.e. a sintered porous support member having a specific porosity. Carlson et al. fail to disclose the claimed electrochemical cell with the claimed support member. Hence, they fail to anticipate the present claims. Reconsideration and reversal of this rejection are respectfully requested.

3. Claims 1 - 5, 8, 15, 17, 18, and 31 are not anticipated by Gorman et al.

Gorman et al. teach a proton exchange membrane (PEM) fuel cell wherein catalyst layers are disposed on both sides of a proton exchange membrane. Bilayer porous plates are positioned adjacent the catalyst layers. Water transport plates (WTP) are positioned adjacent the porous plates that "provide a full planar surface to the bilayer plate and the WTP acts as a water source that may be augmented by inlet stream water saturation up to about 100% relative humidity"

[0011]. The Examiner admits that Gorman fails to teach a sintered porous plate as taught and claimed in the present application.

Merely for informational purposes and as evidence that "sintered" does provide a structural limitation, enclosed with the present response is an exemplary explanation of "sintered" from Schlumberger (http://www.glossary.oilfield.slb.com/Display.cfm?Term=sintered). Here, in one technical field, e.g., oilfield, sintered is described in relation to a filter as "pertaining to a *type* of filter medium...". As Appellants have explained in the present case, "sintered" describes the type of porous support member; and the term "sintered" is not merely a process limitation in an article claim. However, the element of the support member being a sintered support member has not been given its proper patentable weight.

Hence, at least considering Gorman et al.'s failure to disclose an electrochemical cell comprising a sintered porous support, Gorman et al. fail to anticipate the present claim. Reconsideration and reversal of the rejection are respectfully requested.

4. Claim 20 is not anticipated by Anderson et al.

Anderson et al. teach an electrolysis system and a method of operating the system wherein the system comprises a gravity fed water system employing a non-continuous water supply. Here, the Examiner refers to a porous flow field member (Figure 4, #74 and #84). (OA 03/06, pages 6 – 7). However, Anderson et al. refer to elements 74 and 84 as oxygen flow field structure and hydrogen flow field structure, respectively, and not "porous flow field member". Additionally, Anderson et al., as with Gorman et al., do not mention that this member is a sintered support member.

Merely for informational purposes and as evidence that "sintered" does provide a structural limitation, enclosed with the present response is an exemplary explanation of "sintered" from Schlumberger (http://www.glossary.oilfield.slb.com/Display.cfm?Term=sintered). Here, in one technical field, e.g., oilfield, sintered is described in relation to a filter as "pertaining to a *type* of filter medium...". As Appellants have explained in the present case, "sintered" describes the type of porous support member; and the term "sintered" is not merely a process limitation in an article

claim.

Claim 20 claims "a flow field consisting essentially of a sintered porous support member". Again, appropriate patentable weight has not been given to the sintered porous support member. Anderson et al. also fail to disclose a sintered porous support member. Since to anticipate a claim, a reference must disclose each and every element of the claim, Anderson et al. fail to anticipate the present claim. Reconsideration and reversal of the rejection are respectfully requested.

5. Claims 16, 19, and 23 are non-obvious over Carlson et al.

As explained above, Carlson et al. fail to teach all of the elements of the independent claims (e.g., Claims 1 and 20), and for at least this reason, fail to render the claims obvious.

It is alleged that,

> Even though Carlson does not explicitly teach that the support members comprise the first and second electrodes, one of ordinary skill in the art would have found the integration of the support members and the electrodes of Carlson obvious since it is well settled that the use of a one piece construction instead of the structure disclosed in Carlson would be merely a matter of obvious engineering choice.

(OA 03/06, page 7)

Appellants note that obviousness is not based upon what an artisan *could do* or what an artisan *may try*, but is based upon what an artisan would be **motivated to do with an expectation of success**. "Rejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness." *In re Kahn*, No. 04-1616 (CAFC March 22, 2006) citing *In re Lee*, 277 F.3d 1338, 1343-46 (Fed. Cir. 2002); and *In re Rouffett*, 149 F.3d 1350, 1355-59 (Fed. Cir. 1998). "When the [Examiner] does not explain the motivation, or the suggestion or teaching, that would have led the skilled artisan at the time of the invention to the claimed combination as a whole, [it is] infer[ed] that the [Examiner] used hindsight to conclude that the invention was obvious." *Id.*

Here, the Examiner relies upon a merely conclusory statement, e.g., that "it is well settled that the use of a one piece construction instead of the structure disclosed in Carlson would be

merely a matter of obvious engineering choice", (OA 03/06, page 7) to allegedly attain the claimed invention. The Examiner has provided no teaching, suggestion, or motivation to combine the electrode(s) with the porous support member(s), and there is no expectation of success. Furthermore, there is no explanation of how such a combination would, could, or might affect the operation of the electrode and/or its interaction with the membrane. The Examiner has not provided the basis to expect that such a combination could function as desired; there is no expectation of success. The present application is not the mere combination of two mechanical components into a single component as suggested in the conclusory statement. The interaction of the components and the ability to function as intended, e.g., the chemical reactions on the electrode and the interaction with the membrane, are also factors. No motivation (besides a merely conclusory statement) and no expectation of success have been provided. Since the Examiner must meet the burden of establishing that all elements of the invention are disclosed in the prior art, i.e., that the prior art relied upon must contain some suggestion or incentive that would have motivated the skilled artisan to modify a reference or combined references, and that the proposed modification of the prior art must have had a reasonable expectation of success, and since that burden has not been met, no *prima facie* case of obviousness has been established. Reversal of this rejection is respectfully requested.

6. Claim 9 is non-obvious over Carlson et al. in view of Shiepe et al.

It is first noted that, as a dependent claim from an allowable independent claim (as discussed above), Claim 9 is, by definition, allowable.

Additionally, it is admitted in OA 03/06 that Carlson et al. fail to teach the single layer porous support member with a porosity gradient. Therefore, Shiepe et al. are relied upon to allegedly teach the use of a pressure pad having a porosity gradient.

Section 103 sets out the test for obviousness determinations. It states, in pertinent part, that such determinations are to be made by consideration of

> . . . the differences between subject matter sought to be patented and the prior art such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the [pertinent] art.

In making a Section 103 rejection, the Examiner bears the burden of establishing a *prima facie* case of obviousness. *In re Fine*, 5 U.S.P.Q. 2d 1596, 1598 (Fed. Cir. 1998). The Examiner

". . . can satisfy this burden only by showing some objective teaching in the prior art or that knowledge generally available to one of ordinary skill in art would lead that individual to combine the relevant teachings of the references". *Id.*

As explained above, Carlson et al., when read as a whole, teach dual-directional flow of oxygen or hydrogen and water. (Col. 3, line 60 – Col. 4, line 9) From this description, it appears that the multiple size pores are distributed throughout the sheet to enable the desired flow. The Examiner has failed to explain how Carlson et al.'s intended function would be achieved if the sheet were replaced with the sheet of Shiepe et al.; i.e., how a porous support member with a porosity gradient would attain the dual-directional flow. Hence, in arriving at this specific construction, the Examiner seems to have destroyed the intent of Carlson et al. In this regard, the courts have held that "[i]f the proposed modification would render the prior art invention being modified unsatisfactorily for its intended purpose, then there is no suggestion or motivation to make the proposed modification." *In re Gordon* 733 F. 2d 900, 221 USPQ 1125 (Fed. Cir. 1984).

Appellant's claims cannot be used as a blueprint for the motivation or expectation of success to combine references. Both the motivation and expectation of success must be present at the time of the present invention, and must not be based upon the teaching of the present application. Here, no expectation of success has been provided that the system of Carlson et al. will function as intended by Carlson et al., once modified as suggested by the Examiner. The combination appears to be based upon a hindsight reconstruction in order to find pieces of the present claims in various references and to piece together the present claims. There is no motivation or expectation of success for such combination, and there is no basis in fact provided that Carlson et al. will function as intended with such modification. Hence, no *prima facie* case of obviousness has been established. Reversal of this rejection is respectfully requested.

7. Claim 9 is non-obvious over Carlson et al. in view of Chartier et al.

Firstly, as a dependent claim from an allowable independent claim, Claim 9 is, by definition, allowable. Also, since Chartier et al. fail to cure the deficiencies of Carlson et al., Claim 1 and hence Claim 9, remain allowable. Also, as discussed above with respect to Shiepe et al., there is no motivation to combine Carlson et al. with Chartier et al., and no expectation that the combination will function as intended by Carlson et al.

Chartier et al. are relied upon to teach "a porous layer material having a control porosity gradient which can be used in electrodes in and electrochemical cell". (OA 03/06, Page 8) Chartier et al., discuss "dense solid-state electrolyte and electrodes... SOFCs (solid oxide fuel cells)..." (Paragraph [0019 – 0024]), while Carlson et al. are directed to an ion exchange membrane that they are supporting with the porous sheet (Col. 3, lines 60 – 68). These are two different types of electrochemical cells with different properties and different designs. There is no motivation for an artisan to consider a design of a solid-state electrolyte in Chartier et al. as a replacement for a porous sheet of Carlson et al. Appellants maintain that the Examiner has used an improper standard in arriving at this rejection, based on improper hindsight, which fails to consider the totality of the cited references. Searching for particular words in a reference and the existence of those words does not establish a motivation to pick those words out of the reference and use them in different references. References must be read as a whole for what they would teach to one of ordinary skill in the art at the time of the present invention. Combination of the references must be based upon both motivation and expectation of success provided by those references and <u>not</u> by the present application or by the hindsight afforded by the present application. In other words, merely because the words are needed to attain a combination that meets the present claims is not motivation or expectation of success. With no motivation or expectation of success provided at the time of the present application (i.e., without the use of merely conclusory statements), it appears that the Examiner has used Appellants' disclosure to select portions of the cited references to allegedly arrive at Appellants' invention. In doing so, the Examiner has failed to consider the teachings of the references as a whole in contravention of section 103. There is no motivation or expectation of success to combine Carlson et al. with Chartier et al. as suggested in OA 03/06. No *prima facie* case of obviousness has been established.

8. Claims 11, 12, and 30 are non-obvious over Carlson et al. in view of Skoczylas et al.

It is also admitted in OA 03/06 that Carlson et al. fail to teach the claimed channel patterns. (Page 9) Therefore, Skoczylas et al. are relied upon to allegedly teach flow fields with grooves and other flow features. (*Id.*) Allegedly, "one of ordinary skill in the art would have found it obvious to have incorporated the grooves and/or flow features into the porous support member of Carlson in order to form an appropriate flow field for various fluids as taught by Skoczylas..." (*Id.*)

Again, as noted above, Carlson et al. teach a particular porous sheet to attain a particular function. There is no teaching, suggestion, or motivation that the Examiner's suggested modification of Carlson et al. would retain Carlson et al.'s desired function. Additionally, Claims 11, 12, and 30 claim specific channels. There is no teaching in these references of the specific claimed channels (such as "the channel extends from an inlet disposed proximate an edge of the side to a terminus disposed proximate a geometric center of the side", "the channel extends from an inlet disposed proximate an edge of the side to an outlet disposed proximate the same or a different edge of the side", or "the channel is disposed between the first portion and the second portion").

Finally, Skoczylas et al. do not state that "various types of grooves and flow fields are functionally equivalent" as is stated in OA 03/06. (page 9) Merely stating that flow fields of electrochemical cells can comprise various elements does not state that the elements are equivalents. Artisans understand that a list of potential components is just that, a list; it does not establish equivalents. The elements of the list may actually include elements that function well under some conditions and not other conditions, elements that are preferred and that are not preferred, and even elements that do not work well to perform the function. The mere formation of a list is not an affirmative statement that the elements of the list are equivalents.

There is no motivation to combine Carlson et al. with Skoczylas et al. as suggested in OA 03/06, and no expectation of success. Additionally, even combined, there is no teaching of the specific elements of all of the claims, e.g., to dispose the channel between the first portion and the second portion. Therefore, since there is no motivation to combine, since there is no expectation of success, since Skoczylas et al. fail to remedy the deficiencies of Carlson et al., and

since, even if combined, these references fail to teach the specific claim elements, no *prima facie* case of obviousness has been established. Reversal of this rejection is respectfully requested.

9. Claims 6, 9, 16, and 19 are non-obvious over Gorman et al.

As explained above, the independent claims are patentable over Gorman et al., and at least for those reasons, the dependent claims are therefore patentable over Gorman et al.

As is also explained above, Gorman et al. fail to teach the specifically claimed sintered porous support member of the present claims. Gorman et al. also fail to teach several elements of the dependent claims. For example, as is admitted in OA 03/06, Gorman et al. fail to disclose the electrochemical cell wherein the support member comprises the electrode.

In order to overcome these deficiencies, the Examiner relies upon a merely conclusory statement, e.g. that "one piece construction would be merely a matter of obvious engineering choice." (pages 10-11). However, inclusion of an electrode with a support member is not the combination of two mechanical components. Chemical reactivity (e.g., of the electrode) and functionability (e.g., of the electrode and the support member) are factors that must be considered. The combination is not "mere engineering choice". There must be both motivation and expectation of success to combine the elements. Here, neither expectation of success nor motivation has been provided. Again, no *prima facie* case of obviousness has been established. Reversal of this rejection is respectfully requested.

10. Claims 10-12, and 30 are non-obvious over Gorman et al. in view of Skoczylas et al.

Here, Gorman et al. are again relied upon to teach the independent claims, but, as discussed in detail above, they at least fail to teach the sintered porous support member. Also, Skoczylas et al. are relied upon to teach that channels are equivalents, but again as discussed in detail above, they don't even suggest the other elements are equivalents, they merely provide a list and even fail to provide specifically claimed arrangements. Skoczylas et al. fail to provide motivation to modify Gorman et al. as suggested in OA 03/06. The alleged motivation to combine the references is based upon the incorrect contention that Skoczylas et al. teach that the elements are equivalents. Since Skoczylas et al. do not teach that the elements are equivalents, no valid motivation to combine has been provided. Furthermore, since Gorman et al. fail to

teach all of the elements of the independent claims, since Skoczylas et al. fail to cure the deficiencies of Gorman et al., since Skoczylas et al. fail to teach the specific dependent claim elements, and since there is no motivation to combine these references, no *prima facie* case of obviousness has been established. Reversal of this rejection is respectfully requested.

11. Claim 13 is non-obvious over Gorman et al. in view of Carlson et al.

With respect to Claim 13, Gorman et al. are relied upon to allegedly teach the electrochemical cell of Claim 1, while Carlson et al are relied upon to allegedly teach portions with different porosities. (OA 03/06) However, as explained in detail above Gorman et al. fail to teach the electrochemical cell of Claim 1, and Carlson et al., fail to teach portions with different porosities. It is alleged that it would be obvious to incorporate multiple pore sizes into the porous support member of Gorman et al. to allow dual directional flow. (OA 03/06, page 12). However, it is not explained if dual directional flow would work in the system of Gorman et al. or what should be replaced with the multiple pore sizes (the fine pore layer or the coarse pore layer), or if the multiple pore sizes would be in the water transport plate, or if they are in the bilayer of Gorman et al., if the bilayer would still function as intended. Hence, the conclusory statement that because the disclosure exists in Carlson et al., it would be obvious to modify Gorman et al., neither satisfies the requirement of motivation nor expectation of success.

Since the references fail to teach all of the elements of the present claims and since there is no motivation or expectation of success to combine these references as suggested in OA 03/06, no *prima facie* case of obviousness has been established. Reversal of this rejection is respectfully requested.

12. Claims 14, 20-25, 27, and 32 are non-obvious over Gorman et al. in view of Shiepe et al.

Shiepe et al. are relied upon to allegedly teach a particular pressure pad, and hence it would allegedly be obvious to incorporate the pressure pad of Shiepe et al. into the apparatus of Gorman et al. (OA 03/06, page 13) However, Gorman et al. are discussed in relation to their water transport plate (OA 03/06, pages 5 – 6). Gorman et al.'s water transport plate comprises a particular design for a particular purpose. The Examiner has failed to explain why an artisan would be motivated to replace the water transport plate of Gorman et al. with the sheet of Shiepe

et al. As noted above, obviousness is not established on what an artisan *could do* or *may try*, but is based upon what an artisan **would be motivated to do with an expectation of success**, at the time of the present invention. Here, there is no motivation to replace the water transport plate of Gorman et al. with the pressure pad of Shiepe et al., there is no expectation that the pressure pad would function in the same manner as the water transport plate of Gorman et al., and there is also no motivation to just add another component to Gorman et al., e.g., to add the pressure pad of Shiepe et al. Furthermore, even if the pressure pad of Shiepe et al. is incorporated into Gorman et al., this combination still fails to cure the deficiencies of Gorman et al. Since the mere existence of additional components, alternative designs, different configurations, and so forth, is not motivation or expectation of success to change a particular configuration, and since the combination fails to remedy the deficiencies of Gorman et al., no *prima facie* case of obviousness has been established. Reversal of this rejection is respectfully requested.

13. Claim 26 is non-obvious over Gorman et al. in view of Shiepe et al., further in view of Skoczylas et al.

Regarding the combination of Gorman et al. with Shiepe et al., and further with Skoczylas et al., again this combination does not solve the above describe deficiencies. Additionally, there is no motivation or expectation of success to start picking pieces out of the various references to modify Gorman et al. to try to attain the present claims. The relevant test for obviousness is what an artisan **would be motivated to do with an expectation of success**. It is not relevant if an artisan *could* or *might try* a combination, or even that various pieces of a combination are scattered through several references. Here the suggested combination fails to disclose all elements of the present claims. There is no motivation to pick and choose, no expectation of success, and no reason to believe that even if an artisan picked and chose from these references, s/he would arrive at the claimed invention. No *prima facie* case of obviousness has been established. Reversal of this rejection is respectfully requested.

In the event the Examiner has any queries regarding the submitted arguments, the undersigned respectfully requests the courtesy of a telephone conference to discuss any matters in need of attention.

If there are any additional charges with respect to this Appeal Brief, please charge them to Deposit Account No. 06-1130.

Respectfully submitted,

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VIII. CLAIMS APPENDIX

1. (Original) An electrochemical cell, comprising:

a first electrode and a second electrode with a membrane disposed therebetween and in ionic communication with the first electrode and the second electrode; and

a sintered porous support member disposed on a side of the membrane opposite the second electrode, wherein the support member comprises a first portion on first side of the support member proximate the membrane and a second portion disposed on a side of the first portion opposite the membrane, wherein the second portion has a second portion porosity different from a first portion porosity.

2. (Original) The electrochemical cell of Claim 1, wherein the second portion porosity is greater than the first portion porosity.

3. (Original) The electrochemical cell of Claim 2, wherein the first portion porosity is less than or equal to about 60%.

4. (Original) The electrochemical cell of Claim 3, wherein the first portion porosity is about 35% to about 50%.

5. (Original) The electrochemical cell of Claim 2, wherein the second portion porosity is greater than or equal to about 50%.

6. (Original) The electrochemical cell of Claim 5, wherein the second portion porosity is about 50% to about 70%.

7. (Original) The electrochemical cell of Claim 1, wherein the support member comprises a third portion disposed on a side of the second portion opposite the first portion, wherein the third portion has a third portion porosity that is less than or equal to the second portion porosity.

8. (Original) The electrochemical cell of Claim 1, wherein the support member comprises a plurality of layers, wherein each layer has a layer porosity of greater than or equal to a previous layer.

9. (Original) The electrochemical cell of Claim 1, wherein the support member is a single layer comprising a decreasing porosity gradient from the first side toward a second side disposed opposite the first side.

10. (Original) The electrochemical cell of Claim 1, wherein the support member further comprises a second side comprising a channel.

11. (Original) The electrochemical cell of Claim 10, wherein the channel extends from an inlet disposed proximate an edge of the side to a terminus disposed proximate a geometric center of the side.

12. (Original) The electrochemical cell of Claim 10, wherein the channel extends from an inlet disposed proximate an edge of the side to an outlet disposed proximate the same or a different edge of the side.

13. (Original) The electrochemical cell of Claim 1, wherein the second portion comprises higher porosity regions and lower porosity regions.

14. (Original) The electrochemical cell of Claim 1, further comprising a pressure pad disposed in physical and electrical communication with the support member.

15. (Original) The electrochemical cell of Claim 1, further comprising an additional sintered porous support member disposed on a side of the membrane opposite the support member.

16. (Original) The electrochemical cell of Claim 15, wherein the additional support member comprises the second electrode.

17. (Original) The electrochemical cell of Claim 15, wherein the additional support member further comprises a first additional portion on first side of the additional support member proximate the membrane and a second additional portion disposed on a side of the first additional portion opposite the membrane, wherein the second additional portion has a second additional portion porosity different from a first additional portion porosity.

18. (Original) The electrochemical cell of Claim 17, wherein the second additional portion porosity is greater than the first additional portion porosity.

19. (Original) The electrochemical cell of Claim 1, wherein the support member further comprises the first electrode.

20. (Original) An electrochemical cell, comprising:

a first electrode and a second electrode with a membrane disposed therebetween and in ionic communication with the first electrode and the second electrode;

a flow field consisting essentially of a sintered porous support member disposed in electrical and physical communication with the first electrode; and

a pressure assembly disposed in physical and electrical communication with the flow field.

21. (Original) The electrochemical cell of Claim 20, wherein the support member further comprises a first portion adjacent the membrane and a second portion on a side of the first portion opposite the membrane, and wherein the second portion has a second portion porosity different from a first portion porosity.

22. (Original) The electrochemical cell of Claim 20, wherein the second portion porosity is greater than the first portion porosity.

23. (Original) The electrochemical cell of Claim 20, wherein the support member further comprises the first electrode.

24. (Original) The electrochemical cell of Claim 20, wherein the support member is configured to support the membrane at pressures of greater than or equal to about 100 psi.

25. (Original) The electrochemical cell of Claim 24, wherein the pressures are greater than or equal to 500 psi.

26. (Original) The electrochemical cell of Claim 20, wherein the porous support member comprises a channel.

27. (Original) The electrochemical cell of Claim 20, wherein the pressure pad assembly is a pressure pad.

30. (Previously Presented) The electrochemical cell of Claim 1, wherein the channel is disposed between the first portion and the second portion.

31. (Previously Presented) The electrochemical cell of Claim 1, wherein the first portion is a first layer and the second portion is a second layer.

32. (Previously Presented) The electrochemical cell of Claim 21, wherein the first portion is a first layer and the second portion is a second layer.

IX. EVIDENCE APPENDIX

There is no evidence submitted pursuant to 37 C.F.R. §1.130, 37 C.F.R. §1.131, or 37 C.F.R. §1.132 or any other evidence entered by the Examiner and relied upon by the Appellant in this appeal, known to the Appellants, Appellants' legal representatives, or assignee.

X. RELATED PROCEEDING APPENDIX

There are no other related appeals or interferences known to Appellants, Appellants' legal representatives, or assignee that will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.